Installation manual iQuus 3.0

Fendt tractor

GPX Solutions B.V.

www.iQuus.nl

Lutterveld 30a 4117GV

Erich

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1 Introduction

This manual describes how to retrofit the iQuus system onto a tractor. Assembling iQuus is a task that must be done in your own way of working.

Please read this manual carefully before installing/servicing iQuus.

Make sure that the tractor on which iQuus will be installed is completely free of error codes and is working properly and also has the third-party steering unlocked.

2 Structure of iron parts

The construction of the iron parts must be done at your own way of working, this manual gives a number of examples.

2.1 Bumper mounting (optional)

Build up the bumper as shown in the picture below:

(Insert exploded view)

Drill a hole in the middle of the emergency stop to allow the cable to enter through the side. (insert photo)

Mount the obstacle avoidance sensors inside the enclosure (insert photo or exploded view)

2.2 Bumper connector (optional)

To mount the bumper connector, a metal bracket must be attached to the tractor. This bracket must be mounted on the front of the tractor, this makes it possible to remove the bumper from the tractor when not in use.

Make sure that the mounting plate and later the connector are not in front of the tractor lights or that the tyres don't touch the connector when steering or oscillating the front axle.

Use the included mounting plate for the connector

Picture 1: Bumper Connector Mounting Plate

2.3 Rear Emergency Stop

Place the 2 rear emergency stops on the back of the tractor fender on the left and right sides. Screw into the plastic fender with the supplied M4 bolts. Take care of where you place the screw holes, the corrugated nature of the fender may introduce difficulties in securing the bolts.

Note:

Make sure that the user or a bystander can easily use the emergency stop. The emergency stops should therefore be placed as far to the side as possible.

(Add picture here)

2.4 VDM

Remove the checker plate on the standing platform on the right side of the tractor. Remove the existing screws and mount the VDM base plate to the existing holes in the cover plate, larger screws are necessary due to the added thickness of the VDM base plate.

Picture 2: VDM Base Plate and VDM mounted in sockets.

2.5 Brake cables

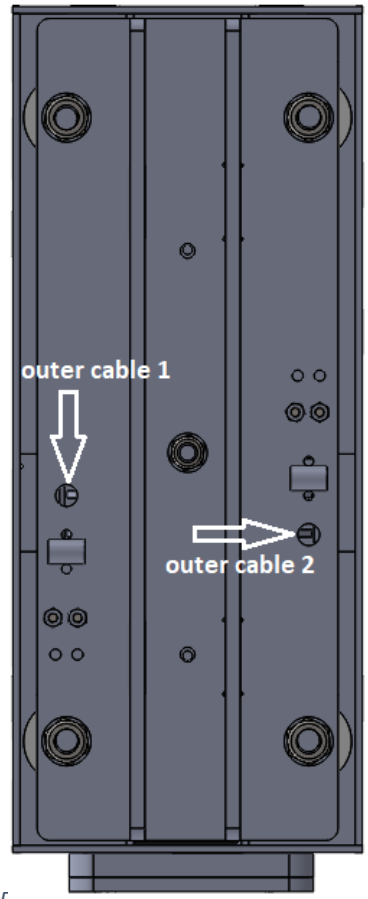
The brake cable must be mounted on the brake pedals. To do this, a support must be made and fitted behind the pedals so that the outer cable of the brake cable can be mounted in it.

Make sure that the brake cables do not make sharp turns, as this will cause the cables to be damaged or to run too stiffly. The 2 round eyelets must be mounted on the pedals. Use a through-bolt to secure the eyelet rounds to the pedals. See the image on the left for an example. The inner cable must run as straight as possible to the outer cable, otherwise this cable will be damaged too much.

Picture 3: Mounted brake cables on brake pedal

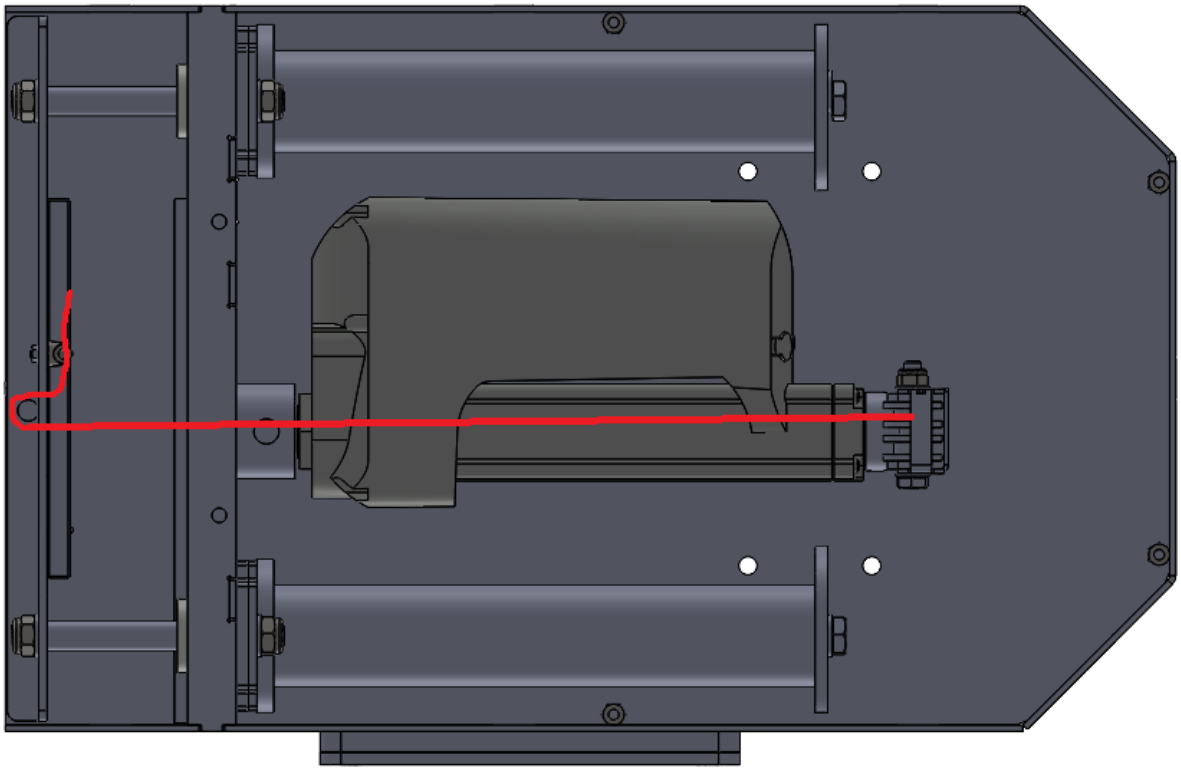
Install the 2 open ends of the cables into the brake module.

The outer cables must be mounted into the 2 large holes as shown on the right:

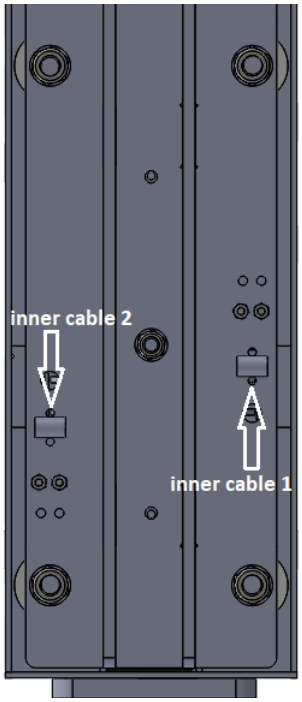


Picture 3: Mounting points outer cable brake module

Assemble the inner cable over the actuator as shown below, make sure that the cable runs smoothly over the pulley.



Picture 4: Wire rope route brake module



Assemble the cables through the bottom of the brake module and secure the cable with the 2 radius wire clamps.

Make sure there is no tension on the steel cable, because if there is tension the brake pedals will remain depressed without deliberate actuation.

Picture 5: Mounting points inner cable brake module

3 GPS installation

3.1 Surface-mounted GPS

The GPS system used by iQuus is a stand-alone system. For its assembly refer to the manual of the GPS supplier.

3.1.1 Raven SC1

If a Raven SC1 is supplied as a steering controller, the following components will also be supplied with the SC1:

- Raven SC1
- Raven SC1 cable
- On-off switch (mounted on control bracket)
- Raven SC1 mounting plate
- Raven SC1 protective cover

Mount the SC1 to the mounting plate, the PeakCAN module is also mounted onto the mounting plate to the right of the SC1.

Mount the SC1 mounting plate behind the driver's seat, if the seats bolts are accessible these can be used to provide a stable platform.

[IMAGE]

Plug in the Raven SC1 cable and the 2 PeakCAN DB9 plugs, place the protective cover over the SC1 and PeakCAN and secure using the provided bolts.

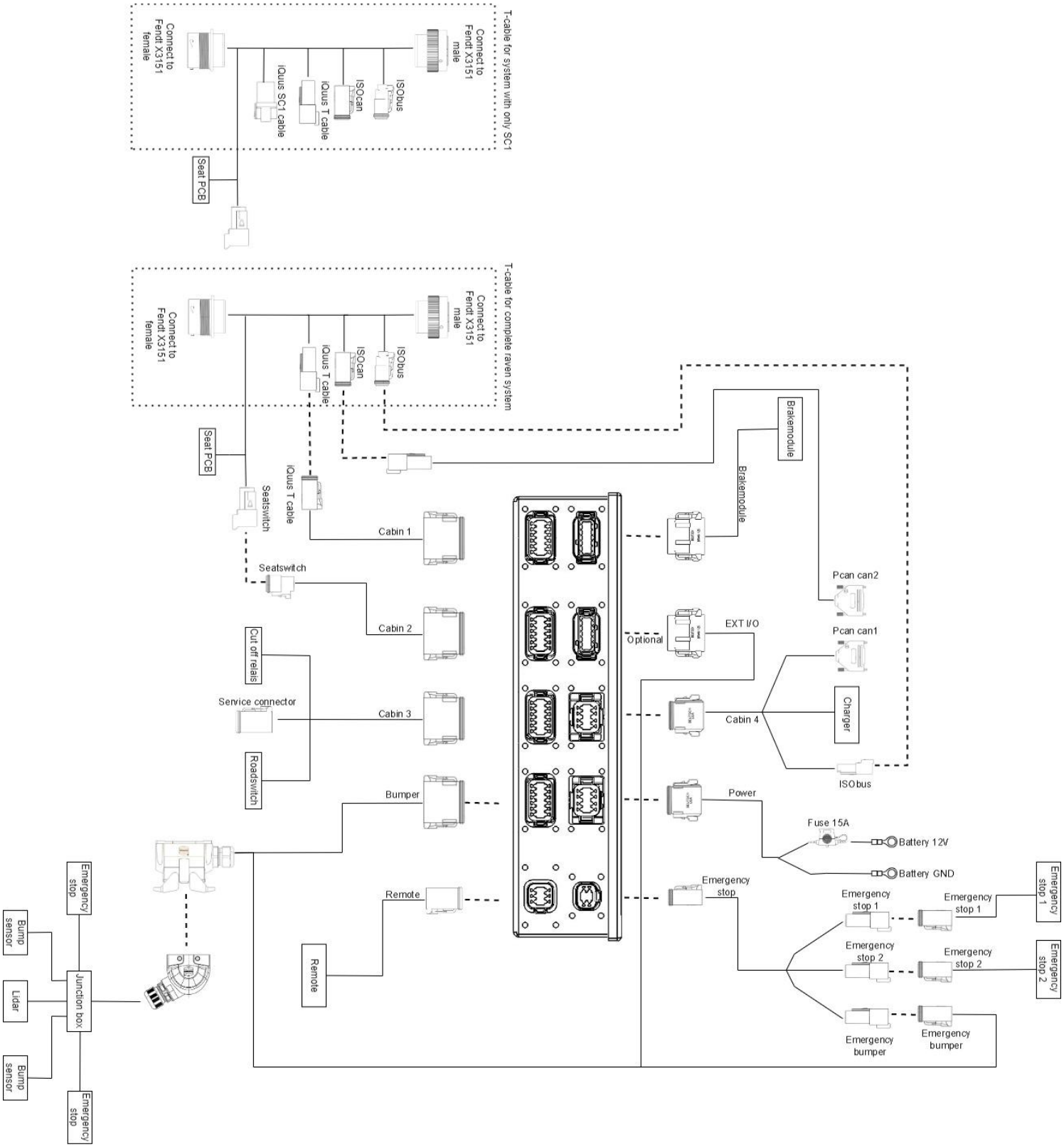
Run the Raven SC1 DB9 terminal to the DB9 terminal in the roof.

Run the Raven SC1 power cable to the control bracket below the tablet, terminate this cable in the toggle on/off power switch in the control bracket below the IQuus tablet.

3.2 Connection GPS and iQuus

iQuus connects via the ISObus. This is done by the ISOcan cable. See chapter 4.11 "ISOcan" For more information

4 Cabling + electronic components



4.1 VDM Cabling

The brake module is delivered wired and tested, it only needs to be connected to the VDM and to the battery

Plug the grey 12 pin deutsch plug into the VDM.

Connect the power supply (cable with fuse holder) to the battery, with the cable with the fuse attached to connect to the positive (+) terminal of the battery and the other to the negative (–) terminal of the battery.

4.2 External inputs/outputs (optional)

Install the black Extended I/Os plug in the VDM and run the other end to the connector on either the back or front of the tractor. If the bumper cable has an additional extended I/Os connector, connect this plug in the VDM

4.3 Tablet and Switch Bracket

Install the Ram Mount in the cabin on the existing rail. Mount the tablet holder and switch bracket to the Ram Mount.

Picture 6: Iquus tablet with switch bracket installed

Wire the following leads to the Switch Bracket:

- SC1 power switch (connected to the SC1 Cable)
- Roadswitch (connected to the Cabin 3 cable)
- Service Connector (connected to the Cabin 3 cable)
- USB power (connected to the Cabin 4 cable)

4.4 Cabin 4 + charger

Install the Grey 8 pin connector into the VDM.

Install the PCAN-USB PRO into the tractor behind the seat on the provided mounting plate. Make sure that the PCAN-USB PRO cannot move to prevent damage. Use the supplied double-sided Velcro tape

Insert the Cabin 4 cable into the cabin and mount the DB9 connector "Pcan Can1" into port "CAN1/LIN1" of the PCAN-USB PRO.

The end labelled “Charger” on the Cabin 4 cable can be used for the charger for the iQuus tablet. This is a constant 12V. If you wish, a 12V supply for the tablet charger can also be branched off elsewhere in the tractor. To use the supplied charger, run the 12V cable up to the switch bracket below the tablet, terminate the 12V charger into the supplied USB charger.

Note: The wire colours for this charger may be counter intuitive.

Picture X: Wire colours for charger cable

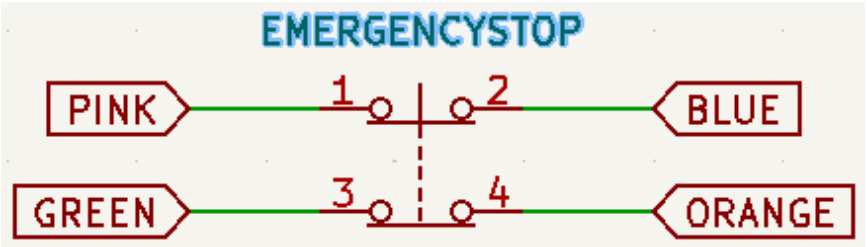
The end labelled "ISObus" of the Cabin 4 cable must be connected to the “ISObus” plug of the T-cable.

4.5 Power

Connect the "Power" cable to the battery. Connect the cable with the fuse holder to the 12V of the battery and the other cable to the GND of the battery.

4.6 Rear Emergency stop cabling

There are 2 separate loops running through the emergency stops. See the below image for connecting the wiring for the rear emergency stops:

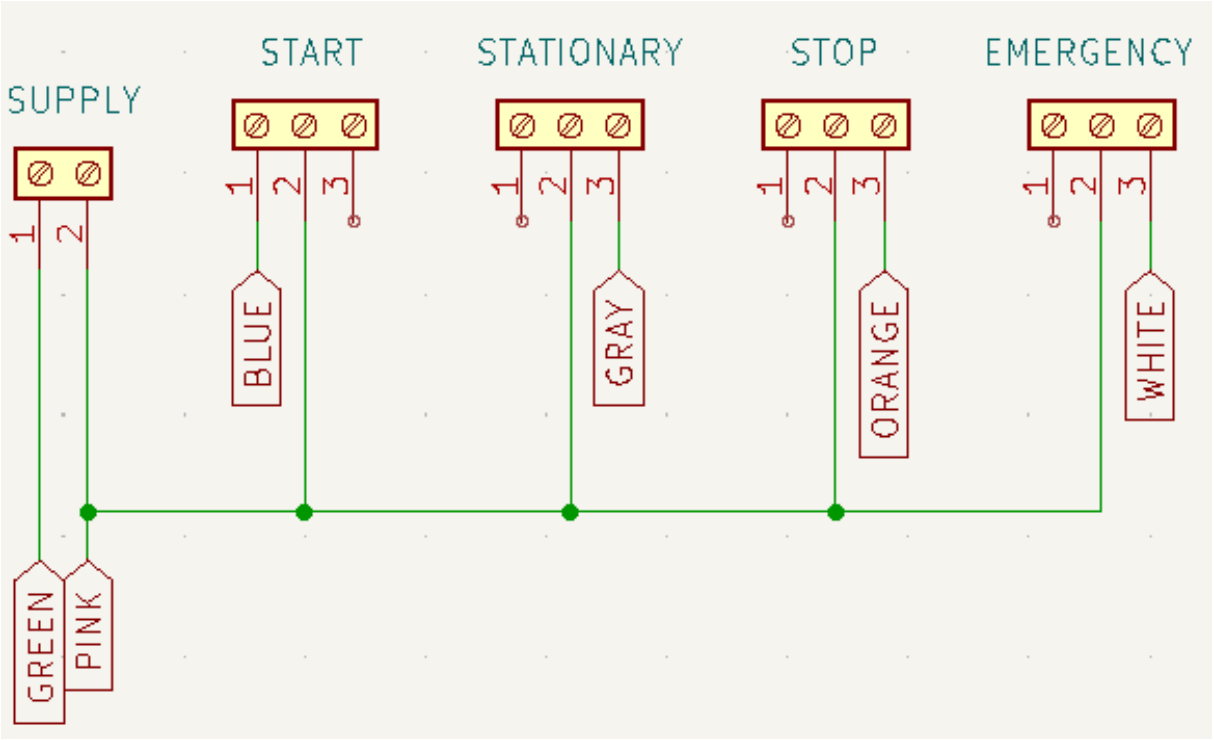


Picture 7: Emergency stop connection diagram

PLEASE NOTE: The wiring to the rear emergency stops is different to the wiring on the front emergency stops.

4.7 Remote Receiver

Mount the remote receiver as high as possible on the tractor for the best reach. Plug in the 6-pin Deutsch connector to provide power. The internal wiring of the remote module is done in the following way:



Picture 8:Remote Connection Diagram

The remote module comes with 1 transmitter that is synced to the receiver, to sync additional transmitters, including a mobile phone via the RIOT Control app:

1. Remove the top cover, make sure power is supplied to the receiver module.

4.7.1 Additional receivers

2. Press the “learn” button the on receiver, the LEDs above the relay modules should now be flashing
3. Press the “learn” button again, one of the relay LEDs should be flashing
4. Continue pressing the “learn” button until the relevant relay LED you want to program is flashing
5. Press the relevant button on the transmitter
6. Continue steps 2-5 until all relays and transmitter buttons are synced

4.7.2 Via Riot Control app

- In the Riot Control app, select “Menu” then select “Add Riot-RX”
- Your smart device is now ready to pair with Riot RX Reciever
- On the receiver, very briefly, press and release the “learn” button, (Receiver TX LED flashes to indicate the receiver is transmitting a learn signal, the Data LED switches off briefly)
- Riot Control app will show “Receiver Detected” message

- Select “Yes”
- Your smart device is now paired to the receiver, with relays 1, 2, 3 and 4 being operated by buttons 1, 2, 3 and 4 respectively.

NOTE: Profiles

The Riot Control app can operate with multiple receivers located in different physical locations. In order to differentiate these in the Riot Control app, each is set as a Profile. For example a user may have a receiver on 2 different tractor modules. The user can communicate with each receiver individually as Profiles “Fendt 939 – Cultivation” and “Fendt 720 – Orchard Spraying”

Picture 9:Remote Connection Diagram

4.8 Bumper (optional)

Install the 12-pin brown connector of the "Bumper" cable to the VDM and the grey 4-pin connector to the emergency stop cable. When assembling the brown connector, make sure it is mounted correctly. With a little too much force, it is possible to mount this connector the wrong way around.

Once these connectors are connected, then mount the large black Harting connector to the mounting plate on the front of the tractor.

Then mount the junction box onto the bumper and connect the following parts: 2x Bumper sensor, Radars, 2x Front Emergency stops.

4.9 Cabin 3

Install the 12-pin green connector of the Cabin 3 cable into the VDM. When assembling the brown connector, make sure it is mounted correctly. With a little too much force, it is possible to mount this connector the wrong way around.

NOTE

The Cabin 3 cable is responsible for controlling the ignition relay. If the Cabin 3 cable is inserted the wrong way, there will be strange behaviour with the ignition on the tractor, including

i) The tractor electronics not being able to be turned on
ii) If the ignition relay is shorted over, either with the 6-pin service connector or a relay cable, the tractor turning on without the key in the ignition.

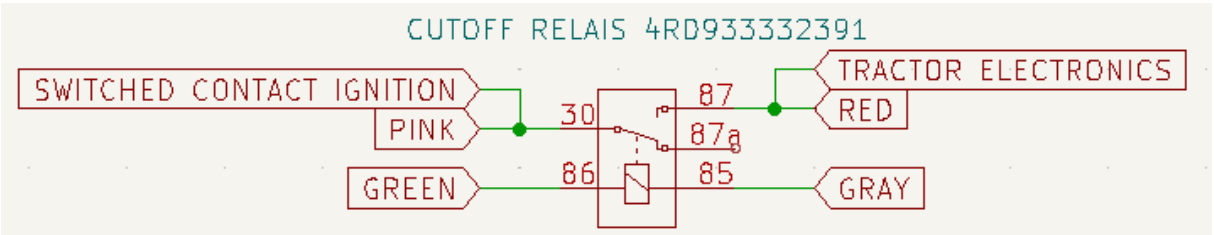
Preferably place the Service Connector in the control bracket below the tablet or otherwise in a place where you can reach it without having to tinker.

Assemble the roadswitch in the following way with the supplied red contacts.

COM = WHITE
NC = PURPLE
+ = YELLOW/GREEN
- = GREY

Picture 10: Roadswich mounted in the switch bracket.

The cutoff relay ensures that the trigger can be switched off during an emergency stop. Connect the relay in the following manner with the supplied relay base



Picture 11: Relay tripping connection diagram

Connect the ‘Switched contact ignition’ to port 5 and 6 of the ignition switch. Connect ‘tractor electronics’ to wire ‘WF0112 gn_6’ use the same wire gauge as the original cable. The relay needs to be in between the ‘switched contact ignition’ and the ‘tractor electronics’ otherwise it is not possible to shut down the tractor in case of an emergency.

Picture 12: Ignition wiring of a Fendt S4 tractor. The green wire is the tractor electronics wire, this is the wire that will be interrupted by the relay.

NOTE:

It is important to mount the ignition relay in an easy to access spot, such as on the steering column cover above the brake pedal, as the ignition relay is a critical component which will prevent operation of the tractor if it fails.

4.10 T-cable

Disconnect the connector X3151 and install the 2 large connectors of the T-cable between them.

- Connect the 4-pin Deutsch plug to the Cabin 1 cable.
- Connect the 3-pin Deutsch plug to the 3-pin seatswitch plug of the cabin 2 cable.
- Connect the 2-pin Deutsch plug to the 2-pin Deutsch plug on the Cabin 4 cable

4.11 ISOcan

Assemble the ISOcan cable to the ISOcan connector of the T cable and mount the DB9 Connector "Pcan can2" into port "CAN2/LIN2" the PCAN-USB PRO.

If there is CRx from Raven mounted in the tractor, it is also possible to mount the 4-pin connector of the ISOcan cable to the "ISOcan" connector of the Raven screen.

4.12 Cabin 2

Install the 12-pin black connector of the "Cabin 2" cable into the VDM and the 3-pin plug in the cabin to the "iQuus T-Cable".

4.13 Cabin 1

Install the 12 pin grey connector of the "Cabin 1" cable into the VDM and then feed the 4 pin plug into the cabin to the "iQuus T-Cable".

5 Adjustment and testing

5.1 GPS

When a complete GPS system is mounted, it will first have to be calibrated, see the manual of the GPS system. The calibration can be checked by creating an AB line and driving it.

If only an SC1 is mounted, it must also be calibrated, see the manual of the SC1. The calibration can only be checked by driving a route autonomously.

5.2 Remote

To program the remote, the following sequence is important:

Clear all remotes first using the below steps:

- Press and hold the Erase button.
- All LEDs near the relays will flash and then turn off.
- Now release the Erase button.
- All remotes are now erased.

All buttons on the remote must be individually assigned to a relay.

- Press the pair/learn button for 2 seconds after releasing, all LEDs at the relays will light up.
- Now briefly press the pair/learn button to select the correct relay.
- Now press the button on the Remote that you want to use with this relay.
- The pair LED will flash briefly 2 times

Repeat for all buttons and relays.

The order of the relays is from left to right: Start, Pause, Stop and Emergency Stop.

Timers are also assigned for all relays.

- Press the Timer button
- The LED of the first relay will flash
- Wait 2 seconds then the LED will be solid on.
- Now press the Timer button again and follow the table shown on the right for the switching times of the relay. (can be read on the row of LEDs on the right side of the PCB)
- After selecting the time, wait 3 seconds until the Timer LED stops flashing, then the new value is saved.

Timed Output	
LED	**Time Delay**
8	60 mins
7	30 mins
6	10 mins
5	1 mins
4	30 Secs
3	10 Secs
2	5 Secs
1	1/2 Sec
0	**Momentary**

Repeat for all relays. Start, Pause and Stop are set to 1/2 sec and Emergency Stop to 10 sec.

5.3 Brake Module

The brake module will calibrate itself on the first start-up. This means that the brake will initialize and the brake will accelerate.

After the first puller, the steel cables will have to be readjusted, otherwise the brake may no longer work properly after a while.

5.4 Object detection (optional)

5.5 Testing the IQuus system

5.5.1 Errors

It is possible to identify errors in the IQuus tablet system, errors are visible on the lower right hand side of the screen, if no errors are visible, a yellow OK symbol will be displayed. To identify errors, click the errors symbol. The latest errors should be visible in a pop-up window on the screen, a brief description is visible as well as possible explanations on the lower portion of the pop-up window.

{IMAGE}

5.5.2 Values

In order to test whether external signals are coming through to the IQuus VDM controller, click on the errors icon on the lower left of the IQuus tablet screen, then click “values” on the left menu in the pop-up.

This is a list of values in the VDM, displaying either “True” or “False”, when this result changes the value will briefly highlight in orange.

Important values to check before deployment are:

- Roadswitch
- Emergency circuits 1 and 2
- Remote functions
- Proximity sensors
- Obstacle detection inputs

5.5.3 Common Errors and Their Remedies

- Steering Passive Proxied
    - The tractor has not given permission to the steering controller to automate steering, try pressing the steering master switch on the armrest.
- Emergency Button Error
    - One of the Emergency buttons is depressed, check each button

5.5.4 Parameters

There are a number of parameters within the VDM that define the operating parameters of the tractor and installation. Your VDM will come with the appropriate parameter settings for your situation. If there is a failure of

Testing IQuus system

- Values
- Parameters
- Test Drive
- Radar tuning (fields & Sensitivity & Settings)